Lake Auburn East Quadrangle, Maine

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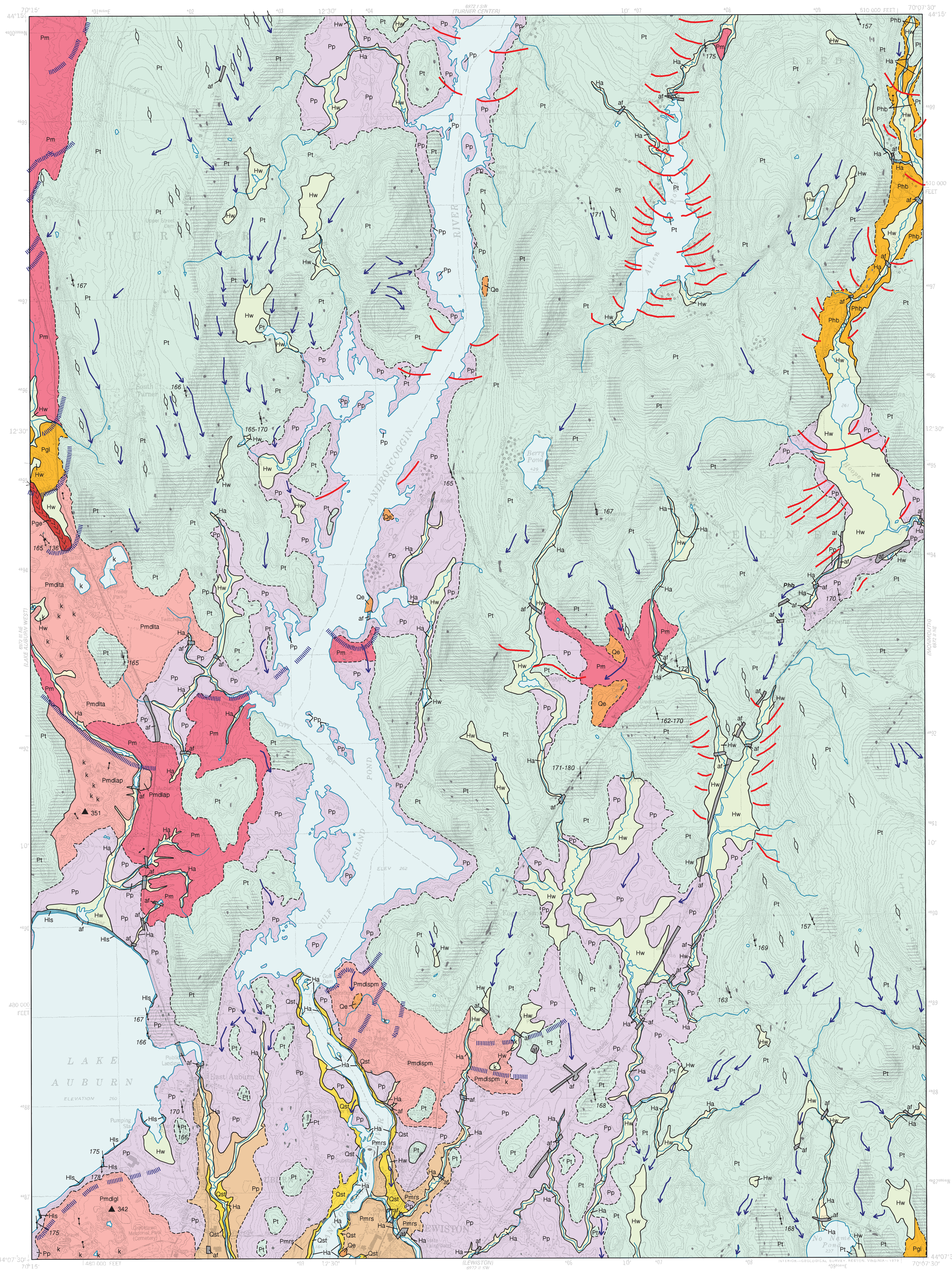
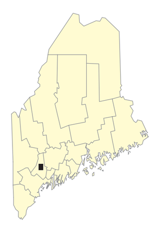
For additional information, see Open-File Report 02-165.

Surficial Geology



SOURCES OF INFORMATION

Surficial geologic mapping by Carol T. Hildreth completed during the 2001 field season; funding for this work provided by the U. S. Geological Survey STATEMAP program.



Quadrangle Location

SCALE 1 : 24,000

1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 10 FEET

TRUE NORTH

Topographic base from U.S. Geological Survey Lake Auburn East quadrangle, scale 1:24,000 using standard U.S. Geological Survey topographic map symbols.

The use of industry, firm, or local government names on this map is for location purposes only and does not impute responsibility for any present or potential effects on the natural resources.

A thin, discontinuous layer of windblown sand and silt, generally mixed with underlying glacial deposits by frost action and bioturbation, is present near the ground surface over much of the map area but is not shown.

af — **Artificial fill** - Man-made. Material varies from natural sand and gravel to quarry waste to sanitary landfill; may include highway and railroad embankments and dredge spoil areas. This material is mapped only where it can be identified using the topographic contour lines or where actually observed. Minor artificial fill is present in virtually all developed areas of the quadrangle. Thickness of fill varies.

Ha — **Stream alluvium** (Holocene) - Sand, silt, gravel, and muck in flood plains along present rivers and streams. As much as 3 m (10 ft) thick. Extent of alluvium indicates most areas flooded in the past that may be subject to future flooding. In places the unit is indistinguishable from, grades into, or is interbedded with freshwater wetlands deposits (Hw).

Hw — **Freshwater wetland deposit** (Holocene) - Muck, peat, silt, and sand deposited in poorly drained areas. Generally 0.5 to 3 m (1 to 10 ft) thick, but may be much thicker in large bogs. In places, this unit is indistinguishable from, grades into, or is interbedded with stream alluvium (Ha).

Hls — **Modern lakeshore deposit** (Holocene) - Sand and/or silt with gravel in places. Developed along the present and prehistoric shorelines of lakes and ponds. Most extensive and thickest on larger lakes, 0.5 to 2 m (1 to 6 ft) thick. Includes spit deposits and may include dune deposits.

Qst — **Stream terrace deposit** (Holocene and Late Pleistocene) - Sand, silt, gravel and occasional muck on terraces cut into glacial deposits in Androscoggin River valley. These terraces formed in part during late-glacial time as sea level regressed. From 0.5 to 5 m (1 to 15 ft) thick.

Qe — **Eolian deposit** (Holocene and Late Pleistocene) - Fine- to medium-grained, well-sorted sand. Found as small dunes on a variety of older glacial deposits. Deposited after late-glacial sea level regressed from the area and left fine-grained marine sediments exposed to wind erosion and transport before vegetation established itself and anchored the deposits. Many more thin dunes are present in the area than are delineated on the map. Thickness usually varies from 0.5 to 2 m (1 to 6 ft), but is greater in places.

Pmrs — **Marine regressive deposits** (Pleistocene) - Sand, silt, and minor gravel. Consists of reworked marine delta and other glacial sediments redistributed by marine currents and wave action as sea level fell during late-glacial time. As much as 3 m (10 ft) thick.

Pgi — **Undifferentiated ice-contact deposits** (Pleistocene) - Sand, gravel and silt. Consists of ice-contact esker, delta, or glaciomarine fan deposits. Thickness varies from 0 to 15 m (0 to 50 ft).

Phb — **Glaciofluvial and glaciomarine deposits of Hooper Brook valley** (Pleistocene) - Sand, silt, gravel, and mud. Consists of fluvial, subaqueous fan, and outwash deposits graded to the contemporary sea. In places, overlain by unmapped thin dune deposits. Thickness varies from 0.5 to 6 m (1 to 20 ft).

Pm — **Glaciomarine sediments, undifferentiated** (Pleistocene) - Sand, gravel, and clay-silt deposited in the late-glacial sea as delta, fan, sea floor, and/or nearshore sediments. Locally overlain by unmapped thin dune deposits. Thickness varies from 0.5 to 9 m (1 to 30 ft).

Pmdi — **Glaciomarine ice-contact delta deposits** (Pleistocene) - Composed primarily of sorted and stratified sand and gravel graded to the contemporary sea. Distinguished by flat, sometimes kettled top, and topset-foreset beds. Thickness varies from 0.5 to 21 m (1 to 70 ft). Four deltas have been assigned the unique geographic names listed below:

- Pmdigl - Gracelawn delta; topset-foreset contact at elevation 342 ft (104 m) (Thompson and others, 1989)
- Pmdiap - Auburn Plains delta; topset-foreset contact at elevation 351 ft (107 m) (Thompson, unpub. data)
- Pmdita - Twitchell Airport delta
- Pmdispm - Saint Peter Cemetery-Merrill Road delta

Pp — **Presumpscot Formation: glaciomarine sea-floor deposits** (Pleistocene) - Silt and clay with local sandy beds and intercalations. Consists of late-glacial submarine fine-grained (marine mud) bottom deposits. Commonly lies beneath surface deposits of units Pmdi, Pm, and Pmrs; in places may be overlain by unmapped thin dune deposits. As much as 50 m (150 ft) thick.

Pge — **Esker deposits** (Pleistocene) - Sand and gravel deposited by glacial meltwater flowing in tunnels within or beneath the ice. As much as 21 m (70 ft) thick.

Pt — **Till** (Pleistocene) - Light- to dark-gray, nonsorted to poorly sorted mixture of clay, silt, sand, pebbles, cobbles, and boulders; a predominantly sandy diamicton containing some gravel. Generally underlies most other deposits. Thickness varies and generally is less than 6 m (20 ft), but is probably more than 30 m (100 ft) in many drumlins and streamlined hills. Many streamlined hills in this area are bedrock-cored.

Bedrock exposures. Not all individual outcrops are shown on the map. Gray dots indicate individual outcrops; ruled pattern indicates areas of abundant exposures and areas where surficial deposits are generally less than 3 m (10 ft) thick. Mapped in part from aerial photography, soil surveys (McEwen, 1970), and previous geologic maps (Prescott, 1968).

Contact - Boundary between map units; dashed where very approximate.

>>>>> **Esker crest** - Chevron points in inferred direction of meltwater flow.

Channel eroded by glacial meltwater or meteoric water flow. Arrow indicates flow direction.

Phb — **Meltwater channel/spillway** associated with Hooper Brook glacial deposits, showing flow direction.

Direction of dip of cross-bedding - Arrow shows average dip direction of cross-bedding in fluvial or deltaic deposits, which indicates direction of streamflow or delta progradation. Point of observation at tip of arrow.

135 — **Glacial striation** - Point of observation is at dot. Arrow shows ice-flow direction inferred from striations on bedrock. Number is azimuth (in degrees) of flow direction.

Ice-margin position - Line shows an inferred approximate position of the glacier margin during ice retreat, based on positions of meltwater channels, moraines, and/or heads of ice-contact deposits.

Moraine ridge - Line shows inferred crest of moraine ridge deposited at the glacier margin.

Drumlin form or streamlined hill - Indicates general direction of glacial ice movement.

Area of many large boulders, where observed - May be more extensive than shown.

k — **Selected kettle hole**

▲350 — **Glaciomarine delta** - Number indicates, in ft, the elevation of the contact between foreset and topset beds, which marks the position of corresponding sea level (from Thompson and others, 1989; and unpublished data).

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Hildreth, C. T., 2002, Surficial geology of the Lake Auburn East quadrangle, Androscoggin County, Maine: MGS, Open-File Report 02-165, 5 p.
2. Locke, D. B., and Hildreth, C. T., 2002, Surficial materials of the Lake Auburn East quadrangle, Maine: MGS, Open-File Map 02-150.

REFERENCES

1. McEwen, B. W., 1970, Soil survey of Androscoggin and Sagadahoc Counties, Maine: U.S.D.A. Soil Conservation Service Pub., 83 p., scale 1:15,840.
2. Prescott, G. C., Jr., 1968, Ground-water favorability areas and surficial geology of the Lower Androscoggin River basin, Maine: U.S.G.S., Hydrologic Investigations Atlas HA-285, scale 1:62,500.
3. Thompson, W. B., and others, 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr., (eds.), Neotectonics of Maine: MGS Bulletin 40, p. 43-67.